

REMARKS

Reconsideration of the rejections contained in the Office Action of October 23, 2002 is respectfully requested. Withdrawal of the final Office Action and entry of the above amendments is further requested.

The Rejections of the Final Office Action of October 23, 2002 must be Withdrawn

In the Office Action, the Examiner rejected claims 14-19 and 30-32 as being unpatentable over Matsuda et al., JP 63-313007 (Matsuda) in view of Itoh et al., U.S. 4,112,746 (Itoh). Furthermore, claims 20 and 25 were rejected as being unpatentable over Matsuda and Itoh and in further view of Hochstein, U.S. Patent 4,712,432 (Hochstein). Further, claims 21-24, 26 and 27-29 were rejected as being unpatentable over Matsuda and Itoh in view of Savage et al., U.S. Patent 5,315,881 (Savage). Lastly, claims 21, 23-24, 26 and 28-29 were rejected as being unpatentable over Matsuda in view of Itoh and in further view of Karim-Panahi et al., U.S. Patent 5,438,882 (Karim-Panahi). However, it is respectfully submitted that the present invention, as set forth in prior claims 14-32 and the above amended claims, clearly patentably distinguishes over all of the references cited by the Examiner.

Attention will be particularly directed to the Examiner's combination of Itoh and Matsuda. It is respectfully submitted that this combination of references fails to establish a *prima facie* case of obviousness, and that for this reason the rejection must be withdrawn.

As discussed in the response filed on July 24, 2002, the present invention provides a method and device for measuring the axial elongation of a rotary shaft. Two marks 10 and 12 are provided on a rotational surface of the rotary shaft 1. The marks are inclined with respect to each other. A sensor 14 is provided opposite to the surface of the shaft and operable to generate pulses when the marks have passed the sensor during rotation of the shaft. The axial elongation of the rotary shaft is measured from changes in an interval ratio of the pulses that are generated by the sensor when the marks pass the sensor during rotation of the rotary shaft. This is illustrated by referring to Figs. 2.

Time t1 represents the time from the detection of one mark to the next mark, i.e. from the point of time from the detection of the reference mark to the measuring mark. The time t2 represents

one rotation of the shaft. As discussed in the specification in the paragraphs spanning pages 9 and 10, due to axial elongation of the shaft, pulses generated by the sensor 14 change from an interval ratio of t_1/t_2 in Fig. 2(a) to a ratio of t_{12}/t_{22} in Fig. 2(b). By measuring the change in the pulse interval ratio t_1/t_2 obtained by the sensor 14, the axial elongation of the rotary shaft 1 can be measured.

The advantage of employing the interval ratio of the pulses is that the axial elongation of the shaft is determined irrespective of the rotational speed of the shaft.

In the rejection the Examiner acknowledged that Matsuda does not disclose measuring or determining the axial elongation of the rotary shaft from a change in an interval ratio of the pulses generated by the sensor. However, the Examiner went on to take the position that Itoh teaches a tensile testing system employing a ratio computing circuit. The Examiner refers to column 32, lines 40-43.

However, Itoh is not properly combinable with Matsuda so as to arrive at the present invention as set forth in claims 14 and 18. The reason for this is twofold. First, the reference clearly fails to contain any teachings that would suggest to one of ordinary skill in the art to modify Matsuda to meet the limitations of the independent claims. Secondly, Itoh is non-analogous prior art which is not properly combinable with Matsuda in the first place.

As the Examiner has acknowledged, the deficiency of Matsuda is that it does not employ a change in an interval ratio of the pulses generated by the sensor in measuring the axial elongation of the rotary shaft in claim 14, or have a data processing part operable to determine the axial elongation from the change in the interval ratio as required by claim 18. Itoh has lightness lines 44 and a specimen 40 which are scanned by a scanning device. This is all part of a tensile testing system that is used to test a region of a specimen of rubber or other material defined along the mid portion of the specimen. But Itoh contains no teaching whatsoever that would suggest to one of ordinary skill in the art to modify Matsuda.

Itoh relates to a completely different type of device. There is nothing in Itoh to indicate to one of ordinary skill in the art that some modification of Matsuda should take place. While Itoh is elongating a specimen and determining stress and strain properties of a material in tension, Matsuda

is measuring the axial elongation of a rotary body. There is no relationship between these two. There is nothing for one of ordinary skill in the art in Itoh to apply to Matsuda. They simply bear no relation to each other.

This is borne out by the fact that Itoh clearly is non-analogous prior art. In order for a reference to be properly combinable with another reference in an obviousness-type rejection, the reference must be analogous prior art, i.e. analogous to the invention. A two part test has been established for determining whether a reference is analogous prior art. The Examiner's attention is directed to MPEP §2141.01(a), which sets forth this test. Thus, in order to rely on a reference as a basis for rejection, the reference must either be in the field of Applicant's endeavor, or if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. See the citations in this section of the MPEP.

The field of the present invention is an axial elongation measuring method for a rotary shaft, and a device therefor. The field of Itoh is a tensile testing system, more specifically an opto-electronic testing system. Clearly this is not the same field.

The problems with which the present invention are concerned with are the prior art use of a gap sensor, requiring measurement over a large gap. Further, the present invention was also concerned with reducing the amount of space required for such measurement. By its terms, Itoh is concerned with improving a tensile testing system, avoiding troublesome preparation of specimens, permitting ready mounting and demounting of specimens, and being capable of simultaneously and individually testing a plurality of specimens. Thus, the concerns of Itoh are clearly divorced from those of the present invention.

From the above, it can be readily seen that Itoh does not even rise to the level of analogous prior art with respect to the present invention. As such, the Examiner may not consider it together with the Matsuda reference. For this reason alone, the Examiner's rejection must be withdrawn.

The Examiner states that it would have been obvious to modify the axial elongation measurement system of Matsuda with Itoh by determining a length by means of determining variations and the ratio pulses to obtain length or distance measurements since this only involves a mathematical manipulation of data that are well known in the art, and it has been disclosed that if the

"acts" of a claimed process manipulate only numbers, abstract concepts or ideas or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. It is respectfully submitted that the Examiner's statement is an improper application of the law, unsupported by the evidence of record and irrelevant to the present situation.

Clearly the present invention recites statutory subject matter. The Examiner has raised no issue in this respect. The case cited by the Examiner deals with the issue of what constitutes statutory subject matter.

Nor does the data processing part or the measuring step of claims 18 and 14, respectively, represent subject matter which need not be given any weight by the Examiner. Rather, the Examiner is specifically required to give weight to these parts of the claims and to address the substance thereof. One reason for this is that, contrary to the inferred allegation, the manipulation of data is not a mere manipulation of data, but is a detection and use of physical parameters to arrive at a result corresponding to a physical quantity, i.e. the amount of axial elongation.

In short, then, the Examiner's rejection is clearly unsupported by the evidence of record and the law. The references may not be combined in the manner proposed by the Examiner. Further, there is no suggestion from Itoh, or Matsuda, to make any such modification of Matsuda. Further, the Examiner is required to give weight to the measuring step and the data processing part of the respective independent claims, because the case cited by the Examiner is irrelevant to the subject matter of these claims. For these reasons, the rejections raised by the Examiner must be withdrawn, as must the finality of the rejection. Such is respectfully requested.

The Proposed Amendments Further Distinguish over the Prior Art of Record

While it is clearly not necessary to further amend claims 14 and 18 in view of the prior art discussed above, nonetheless Applicants have now chosen to propose amendments to both independent claims to help speed the prosecution of this application to allowance. Thus, both claims have been proposed to be amended to recite that there are two marks on the rotational surface of the rotary shaft and the marks are oppositely inclined with respect to one another relative to the axial direction of the rotary shaft, so that the circumferential direction interval between the marks changes

according to the axial direction position along the rotary shaft. Thus, both independent claims 14 and 18 have been proposed to be limited to the first embodiment.

With the recited marks on the rotary shaft being positioned opposite one another, the axial elongation of the rotary shaft can be measured using only one sensor. By contrast, Matsuda requires two sensors for detecting the respective reference mark and measuring mark. Thus, the proposed amendments to claims 14 and 18 represent a simplification of the method and the apparatus beyond what is disclosed and taught by Matsuda.

For these further reasons, the present invention clearly distinguishes over the prior art cited by the Examiner.

It is respectfully submitted that these amendments should be entered at this point in the prosecution, because the finality of the previous Office Action should be withdrawn, and because the prior art clearly fails to meet the limitations of the claims, even in their prior form, and because such further amendments serve to further distinguish over the prior art and place the application into condition for allowance. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with Markings to Show Changes Made".

Respectfully submitted,

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